

In re Application of DOUCEUR et al.
Serial No. 09/354,970

REMARKS

The Office action has been carefully considered. The Office action rejected claims 1-5, 7-9, 11-14, 19-21, 24-27, 30-33, 35, 39, and 44 under 35 U.S.C. § 103(a) as being unpatentable over Green et al., U.S. Patent No. 5,949,762 (hereinafter "Green") in view of Burns, U.S. Patent No. 6,098,090 (hereinafter "Burns"). Claim 6, 10, 15-18, 22, 23, 28, 29, 34, 36-38 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Green in view of Burns and Schultz et al., U.S. Patent No. 6,058,489 (hereinafter "Schultz"). Claims 40-43 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Green in view of Burns and Reznak, U.S. Patent No. 6,233,201 (hereinafter "Reznak"). The rejections are traversed in view of the following remarks. No claims have been amended or cancelled. Applicants submit that the claims as presented were patentable over the prior art of record. Entry of the response and reconsideration of the claims under the provisions of 37 C.F.R. 1.116 is earnestly solicited.

Applicants thank the Examiner for the interview held (by telephone) on October 22, 2003. During the interview, the Examiner and applicants' attorney discussed the claims with respect to the prior art. The essence of applicants' position is incorporated in the remarks below.

Turning to the § 103 rejections, the present invention is generally directed towards a mechanism, in software, that limits the interference of a background process with another process, particularly a foreground process. The present invention is not a conventional CPU scheduler, but rather works external to such a scheduler, and possibly in addition to a CPU scheduler. In fact, a primary reason that the invention is beneficial is that CPU schedulers do not schedule anything but CPU cycles, even though other resource (e.g., disk

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I/O) contention is frequently the reason that a background process interferes with a foreground process.

A background process is allowed to be executed for a brief time slice by a background task controller software component. When the task is executed, the actual performance of the background process is measured, and statistically analyzed with respect to its past performance data to determine whether the current performance is degraded relative to its past performance data, whether it is operating normally, or whether more information is needed. This measurement is not simply based on CPU cycles used, but factors in the actual relative performance, including any resource contention, and may be based on various data such as the number of operations performed, the total time taken for those operations, and the relative amount of work performed by each operation.

Because the actual performance is dynamically measured for each execution period, contention for a resource other than the CPU is actively detected, enabling the background process to appropriately and quickly back off from interfering with the foreground process with respect to device contention.

If the measurement indicates that the performance is degraded relative to its past performance data, the background process is likely interfering with the foreground process. In this situation, the background process is then suspended for longer and longer time intervals (is backed off) between allowed executions, until either some acceptable limit is reached, or until the performance of the background process no longer appears to be degraded, which indicates that it is likely no longer interfering with another process. If normal performance is detected, the back-off time interval is reset to some predetermined minimum value. If normal performance is detected or more information is needed, the task

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will again receive authorization to perform work. A critical task may have the suspension time dynamically adjusted based on its relative importance such that it will operate at a higher duty cycle. The measured performance data may be used to automatically and statistically calibrate a target performance value for determining whether the measured performance is degraded.

Note that the above description is for informational purposes only, and should not be used to interpret the claims, which are discussed below.

The Office action alleges that claims 1-5, 7-9, 11-14, 19-21, 24-27, 30-33, 35, 39, and 44 are obvious in view of Green combined with Burns. In order to establish *prima facie* obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). In addition, "all words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). Further, if prior art, in any material respect teaches away from the claimed invention, the art cannot be used to support an obviousness rejection. *In re Geisler*, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed Cir. 1997).

Turning to the rejection of claim 1, claim 1 generally recites executing a background task, receiving data from software indicative of a measured progress of the background task relative to past performance data, and determining when to again execute the background task based on the data.

The Office action cites column 6 lines 49-51 and column 10, lines 32-46 of Green to allege that Green discloses receiving data from a software component indicative of a measured progress of the background task relative to past performance data. Green,

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column 6, lines 49-51 states that a DSP runs under the control of software, but states nothing regarding receiving data from the software, particularly data indicative of a measured progress of the background task relative to past performance data. Green column 10, lines 32-46 describes switching between background processes in a timed round-robin fashion, wherein each background process is given equal time. Applicants respectfully submit that switching between background processes in a timed round-robin fashion as described in Green discloses and suggests nothing regarding receiving data indicative of a measured progress of the background task *relative to past performance data* as generally recited in claim 1.

Surely, the Office action is not suggesting that the "tick" discussed in Green corresponds to data indicative of a measured progress relative to past performance data. A tick just indicates how much time the background process has been given. Without more, it does nothing to measure the progress of the background task *relative to past performance data*. During a "tick," a process may not make any progress, as it may be waiting for information to be read from a disk or for some other resource to become available. Using only a "tick" to determine when to switch suffers the same drawbacks as discussed in the background section of applicants' application.

Applicants respectfully submit that Green does not use past performance data, let alone measure progress relative to the past performance data, as generally recited in claim 1. Neither does Burns disclose or suggest this feature of applicants' invention, as recited in claim 1. Thus, even if Green and Burns were somehow permissibly combined, they would still fail to reach the subject matter recited in claim 1 of the present invention. At least for

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this reason, claim 1 and the claims that depend thereon are patentable over Green in any permissible combination with Burns.

The Office action cites Burns column 2, lines 5-19 and column 5, lines 17-21 to allege that Burns discloses "determining when to again execute the background task based on the data" as recited in claim 1. Burns does not disclose, suggest, or remotely hint using data that is indicative of a measured progress of a background task to determine when to run the background task again. Rather, Burns states that a "background processor task 18 continually loops through active task structure 28 executing each registered task." Burns, column 5, lines 49-50. No calculation or determination is made as to when to again execute the background task. In Burns, a background task executes again in a round-robin manner after a background processor executes all of the other tasks in an active queue. The background tasks Burns describes "are preferably small, or 'lightweight', such that they execute quickly and do not adversely effect [sic] the timely execution of other registered background processes." Burns, column 5, lines 5-8. Each background task "executes from start to finish without interruption." Burns, column 5, lines 6-5. The data recited in claim 1 refers to the data that is indicative of a measured progress of the background task relative to past performance data. There is no disclosure, suggestion, or remote hint that Burns uses this type of data to determine "when to again execute the background task" as recited in claim 1. Rather, Burns just cycles through available background tasks and executes each "from start to finish without interruption." Thus, even if Green suggested providing this kind of data (which it does not), Burns would have no use for the data. At least for this reason, claim 1 and the claims that depend thereon are patentable over Green and Burns.

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Further, forcing a combination of Burns with Green in the manner suggested by the Office action is *taught away* from in Burns. Burns attempts to deal with background processes that are small such that they can “execute quickly” and “from start to finish” so that they “do not adversely effect [sic] the timely execution of other background processes.” Burns, column 5, lines 5-8. Burns states that it is an “object of this invention to provide a background processor which minimizes the amount of system resources required to run background processes.” Burns, column 1, lines 59-61. Burns attempts to accomplish this by eliminating task switching among background processes and having all background processes executed in a single thread of operation. Burns, column 1, lines 61-64 and column 2, lines 38-44. The Office action asserts, however, that Green teaches suspending background processes. Suspension necessarily involves halting a background process in the middle of its operation, i.e., before it has completed execution. Burns teaches, however, having each background task “execute from start to finish without interruption.” Green also indicates that it swaps between background tasks (see e.g., Green, column 10, lines 30-45), thus interjecting the very inefficiencies (e.g., swapping contexts) Burns explicitly teaches away from. Moreover, even the determination of when to run a background process destroys or at least complicates the simplicity of the method taught by Burns, (i.e., continually loop through all active background processes executing each one completely), would render Burns unsatisfactory for its intended purpose, and thus cannot be correct. See *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). At least for these reasons, claim 1 and the claims that depend thereon are patentable over any permissible combination of Burns and Green.

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Regarding other rejections such as the rejection of claim 8, the Office action appears to have searched for certain key words in the cited art, without determining the meaning of those key words or how they might read on the claims of the present invention. For example, the Office action cites Green, column 11, lines 57-58 to allege that Green teaches "wherein increasing the suspend time includes doubling a previous suspend time" as recited in claim 8. In context, the cited text of Green states:

Temporal tasks (execution based in time) are scheduled on a timer based service queue. This provides moderate real-time quality with fine control when a task is executed. This scheduler mechanism doubles for servicing tasks that are run infrequently.

Green, column 11, lines 54-58. This text makes it clear that the scheduling mechanism is not doubling the suspend time, but rather that it "doubles" to serve two purposes, one of which is "servicing tasks that are run infrequently." That a scheduling mechanism serves two purposes does not disclose or suggest that it increases a suspending time by doubling a previous suspend time. Nothing that the Office action has identified in the art cited art, and nothing in the art considered as a whole, disclose or suggest this subject matter. At least for this additional reason, claim 8 is patentable over the cited art.

In rejecting claim 15, the Office action admits that neither Green nor Burns discloses "wherein the background task is executed for a limited time, and the data include a count of the number of operations performed during the limited time" as recited in claim 15, but alleges that column 15, lines 47-52 of Schultz discloses this claimed subject matter. Applicants strongly disagree. The Office action appears to have again searched for some key words without attempting to determine what the words mean in context. In the text cited, Schultz states, "the background task determines if any one of the following

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background disk operations are needed” (column 15, lines 48-50) and then proceeds to list what those operations that are needed are. A list of operations that are *needed* is not the same as counting the number of operations *performed* during the execution of a background task. Indeed, neither Schultz nor any of the other cited references discloses, suggests, or otherwise even hints that the data include a count of the number of operations performed during a limited time that a background task is executed, as generally recited in claim 15. At least for this additional reason, claim 15 and the claims that depend thereon are patentable over the cited art.

The Office action cites the abstract of Shultz to allege that Schultz discloses “wherein the data include the total real time taken for the operations to complete” as recited in claim 16. In the abstract of Shultz, (or anywhere else in Shultz), applicants are unable to find any mention of “real time” let alone any disclosure or suggestion that the data includes “the total real time take for the operations to complete” as recited in claim 16. At least for this additional reason, claim 16 is patentable over the cited art.

The Office action cites Burns, column 4, lines 50-62 to allege that Burns discloses “wherein if the measured progress with respect to the target progress is not determinable by present data, maintaining the suspend time” as recited in claim 9. The cited lines of Burns neither disclose nor suggest anything about whether measuring “progress with respect to the target progress *is not determinable* by present data” as recited in claim 9. In fact, as previously discussed, Burns does not suspend background tasks but rather executes them from “start to finish.” At least for this additional reason, claim 9 is patentable over the cited references.

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Turning now to independent claim 32, claim 32 generally recites executing a task of a background process, measuring the progress via software, comparing the progress of the task against a target progress that is based on at least one previous progress measurement of the task, and if the progress of the task is degraded relative to the target progress, increasing a delay time, and suspending for the delay time before re-executing.

The Office action rejected claim 32 for the reasons stated in rejecting claims 1-3. In making this justification, the Office action stated that claim 32 "is the method claimed of claims 1-3." See Office action, p. 5. Applicants respectfully submit that each claim should be interpreted on its own; indeed, claim 32 has at least one limitation that is not expressly found in claims 1-3. Among other things, claim 32 recites "if the progress of the task is degraded relative to the target progress, increasing a delay time from a previous value thereof." Applicants find no express counterpart of this language in claims 1-3, and if the Office action has found some implicit relationship, then the Office action should explain its interpretation as to what it contends is related, such that applicants can fairly address whether the Office action's (currently unexplained) interpretation is valid.

Furthermore, and more significantly, applicants find no suggestion or teaching in the art cited by the Office action that discloses or suggests this limitation of claim 32. The art cited by is completely devoid of any concept related to increasing delay time "if the progress of the task is *degraded* relative to the target progress" let alone any idea associated with "target progress" or "progress...relative to the target progress." The Office action has not pointed to any disclosure or teaching as required by law to establish a *prima facie* case of obviousness.

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The Office action admits that it is rejecting claim 32 for the same reasons it rejected claims 1-3. In rejecting claims 1-3, however, the Office action pointed to nothing in the cited art that mentions progress that is degraded relative to the target progress as recited in claim 32. Applicants thus challenge the unsupported rejection of claim 32 and the claims that depend thereon and specifically request that the rejection be withdrawn or that a reference or references in support be provided, including a motivation to combine such a reference or references in a manner that would reach the claimed subject matter.

The Office action rejected independent claim 21 for "the reasons as stated above in claims [sic] 1." See Office action, p. 5. Applicants respectfully submit that claim 21 has at least one express limitation that is not found in claim 1. Among other things, claim 21 recites "evaluating the measured performance data with respect to past performance data and providing progress information corresponding thereto." In rejecting claim 1, the Office action has not pointed to anything in the prior art that possibly could disclose or suggest this limitation. Thus, applicants respectfully submit that the Office action has not established a *prima facie* case of obviousness with respect to claim 21.

Furthermore, applicants find no suggestion or teaching in the art cited by the Office action that discloses or suggests the subject matter of claim 1 or claim 21. Applicants thus challenge the unsupported rejection of claim 21 and the claims that depend thereon, and specifically request that the rejection be withdrawn or that a reference or references in support be provided, including a motivation to combine such a reference or references in a manner that would reach the claimed subject matter.

In general, it appears that the Office action has impermissibly used hindsight reconstruction in order to support its § 103(a) rejections. It is well settled that such a

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hindsight reconstruction based on applicants' teachings is impermissible by law, as in order to support a § 103(a) rejection, there must be some teaching, suggestion, or motivation other than applicants' teachings for modifying a cited reference or combining references to achieve the claimed invention. The Office action does not indicate any suggestion or motivation in the prior art of record, either explicit or otherwise, for modifying the references or combining the references in a manner that would achieve the claimed invention, or point out any teaching as to how such a modification or combination might be accomplished, or what might be accomplished thereby.

For example, in rejecting claim 6, the Office action states, "It would have been obvious to a person skill [sic] in the art at the time the invention was made to combine the teachings of Green, Burns and Schultz because Shultz's teaching would allow the system to focus on more important task [sic] to increase system performance." See Office action, p. 6. In rejecting claim 31, the Office action states, "It would have been obvious to a person skill [sic] in the art at the time the invention was made to combine the teaching of Green, Burns and Schultz's teaching would provide priority execution for other important tasks." See Office action, p. 7. Such broad, conclusory statements do not come close to adequately addressing the issue of motivation to combine, are not evidence of obviousness, and therefore are improper as a matter of law. *In re Dembiczak*, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). Further, if anything, the references teach *away* from such a combination, as discussed above. At least for these additional reasons, the claims are patentable over the cited art.

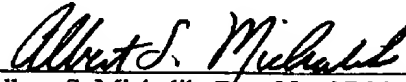
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CONCLUSION

In view of the foregoing remarks, it is respectfully submitted that claims 1-44 are patentable over the prior art of record, and that the application is good and proper form for allowance. A favorable action on the part of the Examiner is earnestly solicited.

If in the opinion of the Examiner a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney at (425) 836-3030.

Respectfully submitted,



Albert S. Michalik, Reg. No. 37,395
Attorney for Applicant
Law Offices of Albert S. Michalik, PLLC
704 - 228th Avenue NE, Suite 193
Sammamish, WA 98074
(425) 836-3030
(425) 836-8957 (facsimile)

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CERTIFICATE OF TRANSMISSION

I hereby certify that this Amendment, Amendment Transmittal, and Petition for Extension of Time are being transmitted by facsimile to the United States Patent and Trademark Office in accordance with 37 C.F.R. 1.6(d) on the date shown below:

Date: November 17, 2003

1610 Amendment


Albert S. Michalik